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Indian Standard

SPECIFICATION FOR NYLON TAPES FOR AEROSPACE PURPOSES

(First Revision)

Second Reprint AUGUST 1997

(Incorporating Amendment No. 1)

UDC 677.754 : 677.494.675 : 629.13

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3 *March* 1980

AMENDMENT NO. 2 DECEMBER 1998
TO
IS 4228 : 1979 SPECIFICATION FOR NYLON TAPES FOR AEROSPACE PURPOSES

(First Revision)

(*Page* 4, *clause* 2.1, *last sentence*) — Substitute the following for the existing:

'Multifilament, bright and high tenacity nylon yarn of 23 tex as specified in Table 1 shall be used in manufacture of nylon tapes. The twist in the resultant yarn shall not be less than 100 per metre both for warp and weft.'

(*Page* 4, *clause* 3.3) -- Insert the following at the end of the clause:

'In case tape is woven on needle loom the selvedge shall be made firm with interlocking thread.'

(*Page* 5, *Table* 1) — Number the existing Note at the end of the Table as Note 1 and insert Note 2 as under :

'2 Ends and picks mentioned in the table are for guidance only. However, these shall be subject to tolerance specified.'

(*Page* 5, *Table* 1) — Incorporate two additional columns as under:

LINEAR DENSITY OF YARN	
Warp	Weft
(13)	(14)
23	23
23	23
23	23
23	23
23	23
23	23
23	23

(*Page* 5, *col* 1, *Table* 1) — Substitute 'Note 1' *for* 'Note' under entry number 4.

(TX 13)

Reprography Unit, BIS, New Delhi, India

IS : 4228 - 1979
(Reaffirmed 1996)

Indian Standard
SPECIFICATION FOR NYLON TAPES FOR AEROSPACE PURPOSES
(First Revision)

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(*Continued on page* 2)

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Indian Standard
SPECIFICATION FOR NYLON TAPES FOR AEROSPACE PURPOSES
(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 June 1979, after the draft finalized by the Textile Materials for Aerospace Purposes Sectional Committee had been approved by the Textile Division Council.

0.2 The tapes covered in the standard are used in the manufacture of various aerial delivery equipment including man-dropping parachutes.

0.3 This standard is based on IND/ADE/0603 'Tape, nylon, dyed/undyed' and IND/ADE/0072 'Tape, nylon, light, undyed/dyed', issued by the Ministry of Defence, Government of India.

0.4 This standard was first published in 1967. In this revision, 25·4-mm tape has been included at the instance of Chief Inspectorate of Textiles & Clothing, Kanpur.

0.5 To familiarize the industry with International System units (SI units), the basic as well as the recommended SI Units for use in the textile industry are given in Appendix A.

0.5.1 Standards of Weights and Measures Act, 1976 also stipulates use of SI Units.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard covers nylon tapes of 14, 19, 25, 32, 38, 44 and 25·4 mm width, generally used in the fabrication of parachutes and other aerial delivery equipment.

2. MATERIAL

2.1 Multifilament, bright and high tenacity nylon yarn of 23, 46 or 92 tex (as specified in the contract or order) shall be used in the manufacture of nylon tapes. The twist in the yarn shall not be less than 100 per metre both for warp and weft.

3. REQUIREMENTS

3.1 The nylon tapes shall meet the physical requirements given in Table 1.

3.2 The tapes shall further meet the chemical requirements given below:

Characteristic	*Requirement*	*Method of Test*
a) *p*H value	6·0 to 8·5	IS : 1390-1961*
b) Colour fastness to:		
1) light	5 or better	IS : 686-1957† or IS : 2454-1967‡
2) washing	No colour bleeding on white cotton/ white wool	IS : 764-1979§

3.2.1 The tapes shall be free from tendering substances.

3.2.2 *Dyed Tapes* — Acid/disperse dyes may be used; however, metallized/chrome dyes shall not be used [*see* IS : 4472 (Part III)-1973||].

3.3 The tapes shall be uniformly woven with firm and regular selvedges in 2/2 herring bone twill weave with one reversal. They should be free from weaving defects and stains.

---

*Methods for determination of *p*H value of aqueous extracts of textile materials.

†Method for determination of colour fastness of textile materials to daylight.

‡Method for determination of colour fastness of textile materials to artificial light (xenon lamp).

§Method for determination of colour fastness of textile materials to washing: Test 3 (*second revision*).

||Methods for identification of application classes of dyes on textile materials: Part III Manmade fibres.

TABLE 1 PHYSICAL REQUIREMENTS OF NYLON TAPES

(*Clause* 3.1)

WIDTH, mm	LENGTH/ ROLL	THICKNESS, mm	ENDS IN FULL WIDTH	PICKS/ dm	NO. OF PLIES		MASS, *Max*		BREAKING LOAD ON FULL WIDTH × 20 cm, *Min*		ELONGATION AT BREAK, PERCENT, *Min*
					Warp	Weft	g/m	g/66-m Roll (Net)	kN	kgf	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
14 ± 1	66 m, unless otherwise specified in contract or order.	0·6 to 1·0	92 ± 5	134 ± 7	2	4	8·7	575	2·225	230	18
19 ± 1		0·5 to 0·8	150 ± 8	148 ± 7	1	2	6·2	410	1·895	193	18
25 ± 1		0·5 to 0·8	75 ± 4	134 ± 7	4	2	11·2	740	3·925	400	18
25·4 ± 1·6 (*see* Note)		0·25 to 0·76	104 ± 5	230 ± 12	1	1	4·5	295	1·345	137	14
32 ± 1		0·5 to 0·8	94 ± 5	134 ± 7	4	2	14·2	940	4·960	506	18
38·0 ± 1·5		0·5 to 0·8	112 ± 6	134 ± 7	4	2	16·8	1 110	5·935	605	18
44·0 ± 1·5		0·5 to 0·8	132 ± 7	134 ± 7	4	2	19·6	1 295	6·915	705	18
METHOD OF TEST	IS : 1954-1969*	IS : 7702-1975†, under a pressure of 210 gf/cm²	IS : 1963-1969‡		—	—	IS : 1964-1970§		IS : 1969-1968‖, after conditioning the test specimens for 48 hours in standard atmosphere (65 ± 2 percent relative humidity and 27 ± 2°C temperature)		

NOTE — This is a special light variety with high cover factor.

*Methods for determination of length and width of fabrics (*first revision*).

†Method for determination of thickness of woven and knitted fabrics.

‡Methods for determination of threads per decimetre in woven fabrics (*first revision*).

§Methods for determination of weight per square metre and weight per linear metre of fabrics (*first revision*).

‖Method for determination of breaking load and elongation at break of woven textile fabrics (*first revision*).

3.4 In respect of requirements not covered in this standard the tapes shall not be inferior to the sealed sample agreed to in the cantract or order.

4. MARKING

4.1 Each roll shall bear a securely attached label with the following information:

a) Name of the material and its net mass (g);

b) Length (m), width (mm) and thickness (mm); and

c) Name/trade-mark of the manufacturer and the year of manufacture.

4.2 BIS Certification Marking

The product may also be marked with Standard Mark.

4.2.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

5. PACKING

5.1 An appropriate number of rolls shall be arranged in a cylindrical bundle and secured by jute twine to form a pack. A suitable number of such packs shall be arranged and wrapped with polyethylene film of at least 40 microns thickness (*see* IS : 2508-1978*) and placed in a wooden packing case of adequate strength, previously lined with one layer of waterproof packing paper conforming to Grade 2 of IS : 1398-1968†. The empty spaces, if any, in the packing case shall be stuffed with cushioning materials to avoid damage in transit. The case shall be bound by iron hoops or wires. The gross mass of the case shall not exceed 40 kg.

5.2 Each case shall be marked with the consignment details as provided in the contract or order in addition to the markings given in **4.1**.

6. SAMPLING

6.1 Lot — The quantity of nylon tape of the same width in a consignment shall constitute a lot.

---

*Specification for low density polyethylene films (*first revision*).

†Specification for packing paper, waterproof, bitumen-laminated (*first revision*).

6.2 Unless otherwise specified in the contract or order, the sampling plan given in Table 2 shall be followed.

TABLE 2 SAMPLE SIZE AND CRITERIA FOR CONFORMITY

(*Clauses* 6.2 *and* 6.2.2)

LOT SIZE (NO. OF ROLLS)	SAMPLE SIZE (FOR LENGTH, WIDTH, MASS, THICKNESS, ENDS, PICKS AND PLIES)	PERMISSIBLE NO. OF DEFECTIVE ROLLS IN RESPECT OF TESTS ON SAMPLE ROLLS	SUB-SAMPLE SIZE (FOR BREAKING LOAD, ELONGATION, *p*H VALUE AND COLOUR FASTNESS)	PERMISSIBLE NO. OF DEFECTIVE ROLLS IN RESPECT OF TESTS ON SUB-SAMPLE ROLLS
(1)	(2)	(3)	(4)	(5)
Up to 25	3	0	3	None
26 ,, 100	5	0	4	
101 ,, 150	8	0	5	
151 ,, 300	13	0	7	
301 ,, 500	20	1	8	
501 ,, 1 000	50	1	9	
Above 1 000	80	2	10	

NOTE — ' Indian Standard sampling, inspection and testing scheme for aerospace materials ' is under preparation.

6.2.1 Rolls shall be selected at random.

6.2.2 Sub-sample rolls specified in col 4 of Table 2 shall be drawn from the sample rolls selected according to col 2 of the table.

6.2.3 For breaking load and elongation test, an additional 2-m test sample from each of the sample rolls remaining after drawing the sub-sample (*see* **6.2.2**) shall be taken if so specified in the contract.

APPENDIX A

(*Clause* 0.5)

SI UNITS

TABLE 3 INTERNATIONAL SYSTEM UNITS

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

TABLE 4 RECOMMENDED SI UNITS FOR TEXTILES

SL No.	CHARACTERISTIC	SI UNITS		APPLICATION
		Unit(s)	Abbreviation(s)	
(1)	(2)	(3)	(4)	(5)
1)	Length	Millimetre	mm	Fibres
		Millimetre, centimetre	mm, cm	Samples, test specimens (as appropriate)
		Metre	m	Yarns, ropes, cordages, fabrics
2)	Width	Millimetre	mm	Narrow fabrics
		Centimetre	cm	Other fabrics
		Millimetre, centimetre	mm, cm	Samples, test specimen (as appropriate)
		Centimetre, metre	cm, m	Carpets, druggets, *DURRIES* (as appropriate)
3)	Thickness	Micrometre (micron)	µm	Delicate fabrics
		Millimetre	mm	Other fabrics, carpets, felts
4)	Linear density	Tex	tex	Yarns
		Millitex	mtex	Fibres
		Decitex	dtex	Filaments, filament yarns
		Kilotex	ktex	Slivers, ropes, cordages
5)	Diameter	Micrometre (micron)	µm	Fibres
		Millimetre	mm	Yarns, ropes, cordages
6)	Circumference	Millimetre	mm	Ropes, cordages
7)	Threads in fabric:			Woven fabrics (as appropriate)
	a) Lengthwise	Number per centimetre	ends/cm	
		Number per decimetre	ends/dm	
	b) Widthwise	Number per centimetre	picks/cm	
		Number per decimetre	picks/dm	
8)	Warp threads in loom	Number per centimetre	ends/cm	Reeds
9)	Stitches in the knitted fabric:			Knitted fabrics (as appropriate)
	a) Lengthwise	Courses per centimetre	courses/cm	
		Courses per decimetre	courses/dm	
	b) Widthwise	Wales per centimetre	wales/cm	
		Wales per decimetre	wales/dm	

(*Continued*)

TABLE 4 RECOMMENDED SI UNITS FOR TEXTILES — *Contd*

SL No.	CHARACTERISTIC	SI UNITS		APPLICATION
		Unit(s)	Abbreviation(s)	
(1)	(2)	(3)	(4)	(5)
10)	Stitch length	Millimetre	mm	Knitted fabrics Made-up fabrics
11)	Mass per unit area	Grams per square metre	g/m^2	Fabrics
12)	Mass per unit length	Grams per metre	g/m	Fabrics
13)	Twist	Turns per centimetre Turns per metre	turns/cm turns/m	Yarns, ropes (as appropriate)
14)	Test or gauge length	Millimetre, centimetre	mm, cm	Fibre, yarns and fabric specimens (as appropriate)
15)	Breaking load	Millinewton	mN	Fibres, delicate yarns (individual or skeins)
		Newton	N	Strong yarns (individual or skeins), ropes, cordages, fabrics
16)	Breaking length	Kilometre	km	Yarns
17)	Tenacity	Millinewton per tex	mN/tex	Fibres, yarns (individual or skeins)
18)	Twist factor or twist multiplier	Turns per centimetre × square root of tex Turns per metre × square root of tex	$\text{turns/cm} \times \sqrt{\text{tex}}$ $\text{turns/m} \times \sqrt{\text{tex}}$	Yarns (as appropriate)
19)	Bursting strength	Newton per square centimetre	N/cm^2	Fabrics
20)	Tear strength	Millinewton Newton	mN N	Fabrics (as appropriate)
21)	Pile height	Millimetre	mm	Carpets
22)	Pile density	Mass of pile yarn in grams per square metre per millimetre pile height	g/m^2/mm pile height	Pile carpets
23)	Elastic modulus	Millinewton per tex per unit deformation	mN/tex/unit deformation	Fibres, yarns, strands

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